

RELIABILITY REPORT  
FOR  
MAX2851ITK+T  
PLASTIC ENCAPSULATED DEVICES

April 21, 2016

**MAXIM INTEGRATED**

160 RIO ROBLES  
SAN JOSE, CA 95134

<b>Approved by</b>
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Quality Assurance
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## Conclusion

The MAX2851ITK+T successfully met the quality and reliability standards required of all Maxim Integrated products. In addition, Maxim Integrated's continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim Integrated's quality and reliability standards.

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### I. Device Description

#### A. General

The MAX2851 is a single-chip, 5-channel RF receiver IC designed for 5GHz wireless HDMI(tm) applications. The IC includes all circuitry required to implement the complete 5-channel MIMO RF receiver function and crystal oscillator, providing a fully integrated receive path, VCO, frequency synthesis, and baseband/control interface. It includes a fast-settling sigma-delta RF fractional synthesizer with 76Hz frequency programming step size. The IC also integrates on-chip I/Q amplitude and phase-error calibration circuits. The receiver includes both an in-channel RSSI and also an RF RSSI. On-chip monolithic filters are included for receiver I/Q baseband signal channel selection, for supporting both 20MHz and 40MHz RF channels. The baseband filtering and Rx signal paths are optimized to meet stringent WHDI requirements. The downconverter local oscillator is coherent among all the receiver channels. The reverse-link control channel uses an on-chip 5GHz OFDM transmitter. It shares the RF synthesizer and LO generation circuit with the MIMO receivers. Dynamic on/off control of the external PA is implemented with programmable precision voltage. An analog mux routes external PA power-detect voltage to the RSSI pin. The MIMO receiver chip is housed in a small 68-pin TQFN leadless plastic package with exposed paddle.

**II. Manufacturing Information**

A. Description/Function:	5GHz, 5-Channel MIMO Receiver
B. Process:	MB3
C. Number of Device Transistors:	145162
D. Fabrication Location:	USA, Japan
E. Assembly Location:	Thailand
F. Date of Initial Production:	January 21, 2010

**III. Packaging Information**

A. Package Type:	68-pin TQFN 10x10
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1.3 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-3689
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 3
J. Single Layer Theta Ja:	34°C/W
K. Single Layer Theta Jc:	0.4°C/W
L. Multi Layer Theta Ja:	20°C/W
M. Multi Layer Theta Jc:	0.4°C/W

**IV. Die Information**

A. Dimensions:	210.2362X182.6771 mils
B. Passivation:	BCB
C. Interconnect:	Al with top layer 100% Cu
D. Backside Metallization:	None
E. Minimum Metal Width:	0.35 microns
F. Minimum Metal Spacing:	0.35 microns
G. Bondpad Dimensions:	
H. Isolation Dielectric:	SiO <sub>2</sub>
I. Die Separation Method:	Wafer Saw

## V. Quality Assurance Information

- A. Quality Assurance Contacts: Eric Wright (Reliability Engineering)  
Bryan Preeshl (Vice President of QA)
- B. Outgoing Inspection Level: 0.1% for all electrical parameters guaranteed by the Datasheet.  
0.1% for all Visual Defects.
- C. Observed Outgoing Defect Rate: < 50 ppm
- D. Sampling Plan: Mil-Std-105D

## VI. Reliability Evaluation

### A. Accelerated Life Test

The results of the 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 48 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

(where 4340 = Temperature Acceleration factor assuming an activation energy of 0.8eV)

$$\lambda = 22.91 \times 10^{-9}$$

$$\lambda = 22.91 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

The following failure rate represents data collected from Maxim Integrated's reliability monitor program. Maxim Integrated performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at <http://www.maximintegrated.com/qa/reliability/monitor>. Cumulative monitor data for the MB3 Process results in a FIT Rate of 0.08 @ 25°C and 1.33 @ 55°C (0.8 eV, 60% UCL)

### B. E.S.D. and Latch-Up Testing

The WD41-1 die type has been found to have all pins able to withstand an HBM transient pulse of +/-1000V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250mA and overvoltage per JEDEC JESD78.

**Table 1**  
Reliability Evaluation Test Results

**MAX2851ITK+T**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
<b>Static Life Test</b> (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	48	0	

Note 1: Life Test Data may represent plastic DIP qualification lots.